DOCUMENT RESUME

ED 286 042 CE 048 348

AUTHOR Harmon, Hobart L.
TITLE Learning and Memory: Implications for Teaching Adults. A Background Paper on Teaching Adults Prepared for Public Service Instructors, Vocational Teachers, and Vocational Administrators in West Virginia.
PUB DATE 1 Jun 87
NOTE 20p.
PUB TYPE Viewpoints (120)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Adult Education; *Adult Learning; *Adult Students; *Andragogy; Cognitive Style; Learning Strategies; *Memory; Postsecondary Education; *Student Characteristics; Student Motivation

ABSTRACT

This paper presents an overview of research on adult learning and suggests strategies for helping adult students to learn. In the first section of the paper, learning and memory are discussed and factors needed for adults to learn the hows and whys of adult motivation are then discussed. The paper next covers the setting of adult learning and the differences between short-term and long-term memory. Activities by which teachers of adults can facilitate the retention and transfer of learning are listed and explained, and techniques suggested by some researchers are offered. Finally, the paper presents lists of teaching strategies and explores the differences between adult and younger learners as advanced in the literature. (KC)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

LEARNING AND MEMORY: IMPLICATIONS FOR TEACHING ADULTS

ED286042

A BACKGROUND PAPER ON TEACHING ADULTS PREPARED FOR
PUBLIC SERVICE INSTRUCTORS, VOCATIONAL TEACHERS, AND VOCATIONAL ADMINISTRATORS
IN WEST VIRGINIA

BY

HOBART L. HARMON, PH.D.

ASSISTANT DIRECTOR OF CURRICULUM & PERSONNEL DEVELOPMENT
WEST VIRGINIA DEPARTMENT OF EDUCATION
BUREAU OF VOCATIONAL, TECHNICAL AND ADULT EDUCATION
CHARLESTON, WEST VIRGINIA

U.S. DEPARTMENT OF EDUCATION
(Office of Educational Research and Improvement)
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

This document has been reproduced as received from the person or organization originating it.

Minor changes have been made to improve reproduction quality.

Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

H Harmon

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

June 1, 1987

CE048348

TABLE OF CONTENTS

Page

Figure

1 The Events in Learning and Remembering..... 5

Tables

1 Changes in the U. S. Population, 1980-1990..... 1

2 Summary of Differences of Group Responses to Posttest Interview..... 10

3 Differences Between Adults and Pre-Adults on Learning-Relevant Characteristics..... 11

Introduction..... 1

Learning and Memory..... 2

Teaching Strategies..... 9

Summary..... 14

References..... 16

LEARNING AND MEMORY: IMPLICATIONS FOR TEACHING ADULTS

Introduction

The population of the United States is growing older. The adult population segments, especially the mature and older adults, are the fastest growing parts of the population. While the present total population of the United States is about three times its 1900 figure, those aged 40-49 are approximately five times their number of 1900, those aged 50-59 six times, and those aged 60-69 nearly seven times the number of their counterparts in 1900. In the decade of the 1980s the size of the population in the age ranges 25-34, 35-44, and 45-54 years will increase by 15.5 percent, 42.4 percent and 11.5 percent, respectively. Substantial decreases will occur in the 14-17 and 18-24 years group -- the traditional secondary and college age students.

Table 1 illustrates changes in the United States population from 1980 to 1990.

Table 1 Changes in U. S. Population, 1980-1990

Age (years)	Number in millions 1980	1990	Change (%)
14-17	15.8	12.7	-19.6
18-24	29.5	25.1	-14.9
25-34	36.2	41.1	+13.5
35-44	25.7	36.6	+42.4
45-54	22.7	25.3	+11.5
55-64	21.2	20.8	- 1.9
65 and over	24.9	29.8	+19.7

Source: U.S. Bureau of Census, Population Estimates and Predictions, Series P-25, 1978.

The aging population will have considerable effect upon the nation's educational system. Trends in demographics and education suggest large numbers of adults will need and expect increased services from the educational system. To meet the educational needs of adult learners, a fundamental knowledge of adult learning will be needed by administrators and teachers in the nation's educational system. This paper presents a discussion of adult learning and memory relative to instructional practices for teaching adults.

Learning and Memory

In the book entitled Adult Learning: Research and Practice, Long (1983) stated:

> The processes of learning and memory are so closely related and interdependent that it is often difficult to determine whether we are concerned with one phenomenon or two. ... one who does not learn has nothing to remember, and without memory there is no evidence of learning. (p. 58)

A major difficulty in describing the results of research on learning in adulthood is that a distinction must be made between learning and performance. If an individual is unable to perform a given task, this may indicate that the individual failed to learn the task. On the other hand, inability to perform the task may indicate the individual learned the task initially but is unable to perform because of other factors such as:

- loss of speed
- loss of memory
- anxiety
- lack of motivation
- distraction from other sources

In other words, ability to perform may indicate that learning has taken

place, but failure to perform does not prove that learning has not taken place.

Verner and Davison (1982) define learning as follows:

> Learning is a complex activitity, including not only the acquisition of knowledge and skills, but also of attitudes and values. Although it is difficult to describe or define, it is generally agreed that learning is more or less permanent change in behavior that occurs as a result of activity or experience....The act of learning is a process rather than a product.... Learning is the process through which an individual acquires the facts, attitudes or skills that produce changes in behavior. (p. 3)

In order for learning to occur successfully, the adult learner must (Morgan, Holmes, and Bundy, 1976):

* Be motivated to learn
* Establish an attentional set
* Be in a state of developmental readiness to learn
* Be in an environment conducive to learning

Adults are best motivated to learn when that which is to be learned relates or is meaningful to their needs, goals, habits, values, and self-concept. The adult's willingness to participate in learning depends upon such factors as: perception of the value of learning, acceptance of what and how to learn, need for self-esteem or social affiliation with others, and expectations from life.

As adults grow older, they appear to develop a less intense attentional set and are less able to maintain it over long periods of time. This phenomena is not only attributable to physiological changes in sensory perceptions with aging, but it also is a product of experience in everyday life.

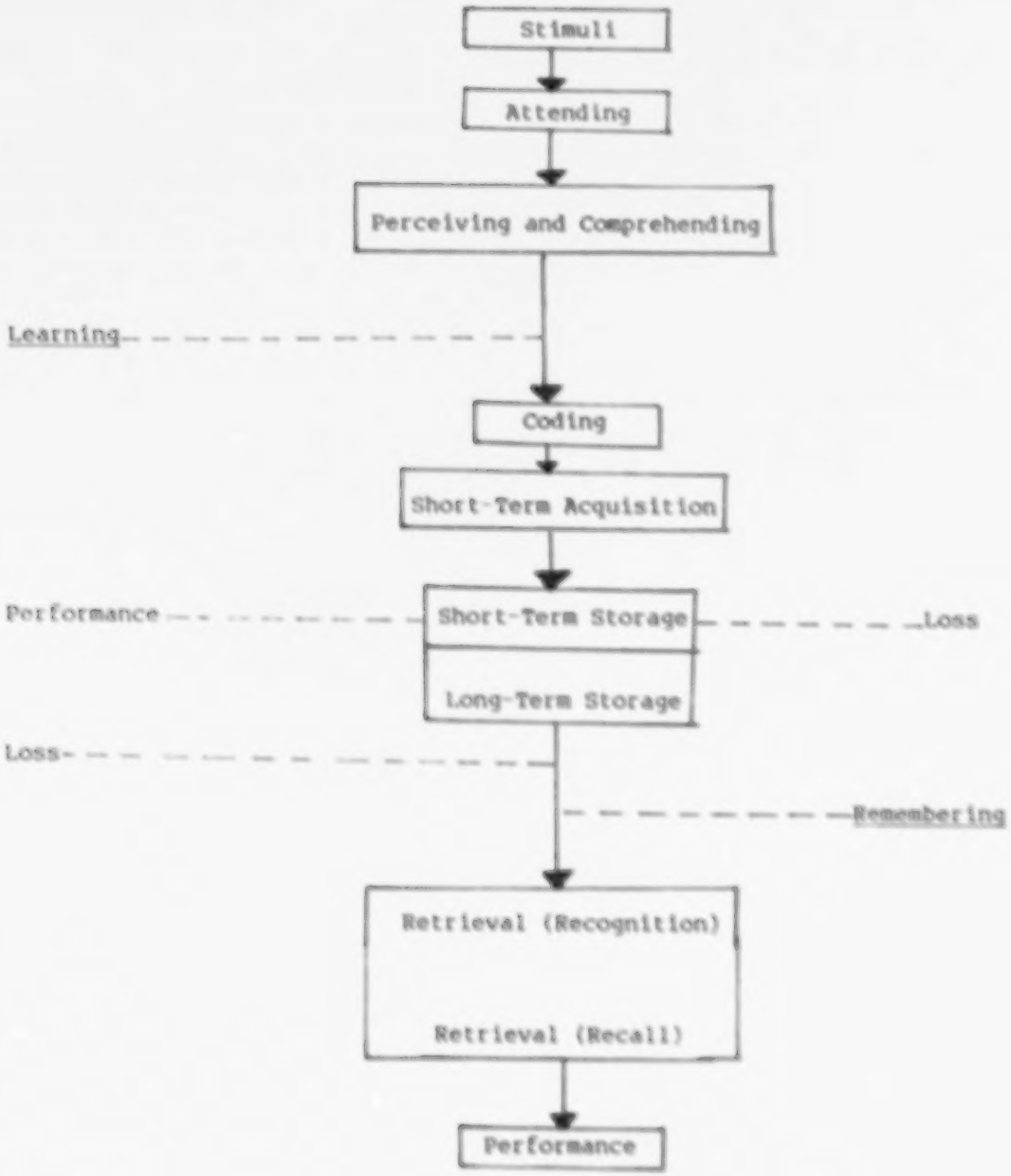
Learning cannot occur unless there is a sufficient degree of maturation of the sense organs, the central nervous system, and other physiological criteria. The individual also must be relatively free from psychological barriers such as emotional instability. Another readiness factor is the adult's possession of previously learned abilities that are prerequisite to the new learning. Adults may not be ready to learn and some may resist or be unwilling to learn. Fear, insecurity, attitudes and values may render the adult unwilling to participate in learning -- limitations to the adult's readiness to learn.

Adults are influenced by the environment in which they attempt to learn. The physical setting must be comfortable with respect to furniture, equipment and temperature, and free from external extractions or influences.

If the adult is motivated and ready to learn in a good learning environment, learning should take place. Probable steps in the learning and remembering process are illustrated in Figure 1 (Gagne, 1970; Welford, 1968).

The stimulus directs the learner's attention to the specific learning task. The stimulus should be presented to the adult learner in such a way as to gain and hold the attention of the learner. Once the learner is attentive to the stimulus, perceiving and comprehending occurs. The learner will select the elements that are important and proceed to code the information in a way that is functional to his/her unique memory stage system. The information is stored (after acquisition stage) in the short-term or long-term memory. The individual then can retrieve the information, through recognition or recall, and use it to perform tasks.

Figure 1. The Events in Learning and Remembering



The adult learner has better ability for recognition than for recall. Recognition usually is associated with cues. The more meaningful the information, the greater the retention. The more often the adult uses what is learned, the longer it will be remembered. Recall ability of adults tends to decline with age.

Teachers of adult learners can facilitate the retention and transfer of learning by such activities as the following:

1. Encouraging the learner to search for relationships between what is currently being learned and past learning. Transfer possibilities increase as the learner actively searches for points of similarity and difference in two or more situations. Retention is increased as the learner reorganizes facts, concepts, and principles into a meaningful structure.
2. Providing reviews in which the learner encounters previously learned material within new activities. Overlearning and the structuring of old learning in new situations aid both retention and transfer. The degree of original learning is crucial to retention of the learning.
3. Providing well-distributed practice in problem solving. Problem solving is itself an exercise in transfer as the learner strives to alter what he/she knows to a problem situation, and problem-solving skills once attained are well retained.
4. Relating materials learned in instruction to the abilities, needs and interests of the learner. The adult learner tends to perceive and remember more accurately material of interest.
5. Stressing generalizations, but making certain that the learner understands the meaning and factual basis for each generalization

thought.

6. Scheduling frequent tests or in other ways creating a "set" to remember.

7. Inducing low stress by arranging for success or anticipation of successful experiences in learning. Adult learners may tend to persist in low-stress situations and become ego-defensive in failure situations. (Adams & Aker, 1982).

It is difficult to isolate learning from memory because learning and memory usually are considered as stages in the process of information acquisition-retention (storage-retrieval). Memory can be thought of as the retrieval from storage of previously-learned material, and learning is an essential prerequisite for meaningful test of memory change with age. If older adults initially have not learned as well as younger adults, then one might not expect them to remember as well either.

Findings on cognitive functioning of older adults suggest that today's older adults do less well than younger adults on standard intelligence tests, especially on performance tests. Older adults do less well on most problem-solving tasks administered in the laboratory, on Piagetian tasks, and on creative tasks. However, many researchers criticize these conclusions and suggest it is inappropriate to compare today's elderly with today's youth--who grew up in times of more formal education than today's elderly.

Denny (1979) suggested that the following techniques may help facilitate better problem-solving performance among older adults:

* Modeling
* Feedback
* Direct instruction

* Practice on similar problems

* Change of response speed

Wass and Olejnik (1983) believe research shows that cognitive differences between younger and older adults are not great. These researchers state:

> It therefore seems appropriate to conclude that developers of educational programs need not be overly concerned with serious cognitive deficiencies among older adults. They should expect the older participants in their programs to be as competent as those of the younger ages. (p. 12)

There have been a number of studies that have investigated differences between young and old adults on learning and memory. Results of the studies are mixed. Some investigators have found an age-related decline in memory using meaningful prose passages similar to those found in research studies using word lists (Taub, 1979; Dixon, Simon, Nowak, & Hultsch, 1982).

Other researchers (Myer & Rice, 1981; Cerella, Paulslock & Poon, 1981) have not found significant differences when using meaningful prose material.

Wass and Olejnik (1983) express their concern for usefulness of research findings on learning and cognition for adults:

> Researchers are still far from providing useful information to practicioners and the generalizability of recent research on cognition and learning is extremely limited....Researchers interested in studying learning and memory effects should consider the educational significance of the observed differences. Even if there were statistically significant age-related deficits in memory, those differences may not have any practical significance from the perspective of learning in an educational setting. (p. 17)

Thibodeau (1980) conducted posttest interviews with six individuals in each of three age groups: late adolescents, young adults, and middle-aged adults. A summary of the groups responses are shown in Table 2. Of practical value are the experiences perceived to help or hinder learning, changes in learning with age, and preferred teaching methods.

Teaching Strategies

Teachers of adults must rely upon rather fragmented research efforts from which to draw conclusions and develop strategies appropriate for teaching adults. Research on memory suggests that the capacity to retain and retrieve information can be enhanced through the use of carefully selected teaching strategies.

Apps (1981) identified a list of exemplary principles for teaching adults. Six of the principles directly included learner-teacher relations: (1) know your students, (2) use student's experiences as class content, (3) provide a climate conducive to learning, (4) provide students feedback on their progress, (5) help students acquire resources, and (6) be available to students for out-of-class contacts.

Adult learning theory prevails among many teachers' instructional practices. Research efforts of educational psychologists and other researchers in various disciplines more recently have attempted to investigate adult learning and instructional practices of teachers. A few studies have compared adults and pre-adults regarding teaching and learning.

One study of significance was conducted by Beder and Darkenwald

Table 2. Summary of Differences of Group Responses to Posttest Interview

Response	Late Adolescents	Young Adults	Middle-Aged Adults
Ability to perceive commonalities among tasks	No (83%)	No (83%)	Yes (50%)
Effect of diagram on ability to solve balance task	Helpful (83%)	No effect (83%)	Helpful (50%)
Effect of talking out loud while solving problems	No effect (67%)	No effect (67%)	Helpful (100%)
Experiences perceived to help learning	Independence, active participation, concrete examples	Demonstrations, methods to save time, explicit expectations, principles vs. facts	Visual presentations, practical information, relaxed atmosphere, working with same level learner, experience valued, planning of own learning
Experiences perceived to hinder learning	Demonstration, being given answers, lack of positive feedback, dependence	Abstract presentations, too much structure, no input in planning	Being rushed, nonrelevant information, condenscending approach
Changes in learning with age	More efficient, better organized, better able to perceive relationships, learning is easier	Motivation, commitment, concentration, depth of preparation and self-expectations are increased	Takes more time, need reinforcement, more relaxed, more fun, more self-directed, better use of experience
Preferred methodologies	Lecture, individual study	Demonstration, small group discussion, group study	Visual presentation, "hands-on" experience, 1:1 student-teacher relationship

(1982). Table 3 shows teacher perceptions of differences between adults and pre-adults on learning-relevant characteristics. The Likert scale used to rate each item was as follows:

	Little or None			Some		A Great Deal	
Adults?	1	2	3	4	5	6	7
Pre-Adults?	1	2	3	4	5	6	7

Table 3. Teacher Perceptions of Differences Between Adults and Pre-Adults on Learning-Relevant Characteristics

Characteristic	Adult Mean	Adult S.D.	Pre-Adult Mean	Pre-Adult S.D.	N	t
Intellectual curiosity	5.5	1.0	4.4	1.2	165	8.46*
Concern with practical implications/applications	5.9	1.2	4.5	1.3	169	10.65*
Motivation to learn	6.2	1.0	4.0	1.1	168	20.25*
Confidence in ability	4.1	1.2	4.5	1.1	169	-3.02**
Willingness to take responsibility for learning	5.9	1.1	3.7	1.1	170	17.28*
Clarity about what they want to learn	5.6	1.1	3.4	1.1	169	18.90*
Willingness to work hard at learning	5.9	1.1	3.8	1.2	169	16.64*
Emotional dependence on teacher	4.2	1.5	4.6	1.3	168	-2.99**

* p less than .0001
** p less than .01

The study conducted by Beder and Darkenwald yielded the following results regarding teacher's perceptions of learner characteristics:

* Adults are more intellectually curious than pre-adults.
* Adults are more concerned with the practical applications/ implications of learning than pre-adults.
* Adults are more motivated to learn than pre-adults.
* Adults are less confident in their ability to learn than pre-adults.
* Adults are more willing to take responsibility for their learning than are pre-adults.
* Adults are more clear about what they want to learn than are pre-adults.
* Adults are more willing to work hard at learning than are pre-adults.
* Adults are less emotionally dependent on the teacher than are pre-adults.

Not only were the differences between the mean scores statistically significant, but in many cases they also were significant in a practical or substantive sense.

Beder and Darkenwald (1982) concluded the following regarding teaching strategies used for adults and pre-adults:

* Teachers make greater use of group discussion for adults than for pre-adults.
* Teachers spend less time on classroom discipline with adults than with pre-adults.
* Teachers vary their teaching techniques more with adults than with pre-adults.
* Teachers spend less time giving directions to adults than to pre-adults.

- Teachers relate class material more to student life experiences for adults than for pre-adults.
- Teachers structure instructional activities less tightly for adults than for pre-adults.
- Teachers make more adjustments in instructional content in response to student feedback for adults than for pre-adults.
- Teachers provide less emotional support for adults than for pre-adults.

It is significant that the teachers were responsive and learner-centered when teaching adults to the extent that they perceived their adult students to be more motivated, more serious, and more self-directed than their pre-adult students.

Jones and Cooper (1982) suggested the following guidelines for teaching adults relative to adult learning and memory:

1. Slower rates of presentation lead to faster learning.
2. Repetition enhances memory. Less repetition is necessary if material is presented over several days rather than concentrated in a single day.
3. Short breaks between learning periods of 30 minutes or more provide for more effective learning.
4. Advance organizers create a "mind set" which aids retention of information.
5. Memory is enhanced through emphasis on past associations and "net-working" with previously acquired knowledge.
6. Learning and memory are apt to be inhibited by the learner's tension and stress.
7. Material presented at the beginning and at the end of a learning

session is more effectively retained than material presented in the middle of a session.

8. Retention of information is enhanced through review of related material before the presentation of new material.
9. Introduction of "new" material often interferes with the ability to retain previously learned material.
10. Memory decreases rapidly after a learning experience except for a very brief period during which it increases.
11. Associations which can be formed visually, or through other senses or the imagination, are more easily established and maintained than those which must be formed abstractly or through the intellect.
12. Visual images usually are remembered more effectively than words.
13. Observations and associations with the learning context and environment often affect retention of information and application of what is learned.
14. Individuals may be eye-minded, ear-minded, or motor-minded in their learning orientations. Eye-mindedness appears to be dominant in the majority of adults.

Summary

This paper attempted to discuss some aspects of adult learning and memory relative to instructional practices for teaching adults. A large number of studies have been conducted on adult learning and memory; however, most of the studies are criticized severely for one reason or another. More research is needed to bring the results of laboratory

experiments into the teaching environment of the adult learner. Improved research on adult learning and memory is needed for practicioners to better understand adult learners and direct adult education programs.

Perhaps the following comments by Long (1983) clearly illustrate the current knowledge of teaching strategies for adults:

> The search to answers about instructional techniques preferred for adults is not clear. Too often researchers have been concerned with comparing techniques without first considering the purpose of the instruction. It is obvious that some techniques are more effective with some people for some purposes than others. However, many educational activities have multiple objectives; for example knowledge gain, improving skill, changing attitudes, and satisfaction with the learning experience. Futhermore, many educational activities include a large variety of learners with differing goals, intelligence, prior specific knowledge, cognitive styles, learning styles, and personalities. (p. 252)

References

Adams, Felix, & Aker, George F. (1982). Factors in adult learning and instruction, theory, innovation, and practice in andragogy. Florida State University. No. 1, June. 67p (ERIC Document Reproduction Service No. ED 228 461)

Apps, J.W. (1981). The Adult Learner on Campus. Chicago: Follett Publishing Company.

Beder, Harold W. & Darkenwald, Gordon G. (1982). Differences between teaching adults and pre-adults: some propositions and findings. Adult Education, 32 (3), 142-155.

Cerella J., Paulshock D., & Poon, L.W. (1981). The effects of semantic processing memory of subjects differing in age. Educational Gerontology, 6, 1-7.

Denny, N.W. (1979). Problem solving in later adulthood: intervention research. In P.B. Bates & O.B. Brim (Eds.) Lifespan Development Behavior, Vol. 2. New York: Academic Press.

Dixon, R.A., Simon, E.W., Nowak, C.A., & Hultsch, D.F. (1982). Test recall in adulthood as a function of level of information input modality and delay interval. Journal of Gerontology, 37, 358-364.

Genen, Robert M. (1970). The Condition of Learning, 2nd ed. New York: Holt, Rinehart and Winston.

Jones, Edward V. & Cooper, Carol M. (1982). Adult education programming and memory research. Lifelong Learning: The Adult Years, November, 22-23 & 31.

Long, H.D. (1983). Adult Learning: Research and Practice. New York: Cambridge Publishing.

Morgan, B., Holmes, G.E., & Bundy, C.E. (1976). Methods in Adult Education. 3rd edition. Danville: The Interstate Printers and Publishers, Inc.

Myer, B.J.F., & Rice, G.E. (1981). Information recalled from pose by young, middle and old adult readers. Experimental Aging Research, 7, 253-268.

Taub, H.A. (1979). Comprehension and memory of prose materials by young and old adults. Experimental Aging Research, 5, 3-13.

Thibodeau, J. (1980). Adult performance on Piagetian cognitive tasks: implications for adult education. Journal of Research and Development in Education, 13, (3), 25-32.

Verner, Coolie & Davison, Catherine V. (1982). Psychological factors in adult learning and instruction. In F. Adams and G. F. Aker Factors in Adult Learning and Instruction, Theory, Innovation, and Practice in Andragogy. No. 1. Florida State University, June, 67 p. (ERIC Document Reproductive Service No. ED 228 461)

Wass, Hannelore, & Olejnik, Stephens F. (1983). An analysis and evaluation of research in cognitive and learning among older adults. (ERIC Document Reproductive Service No. Ed 228 441)

Welford, A.T. (1968). Fundamentals of Skill. London: Methuen & Co., Ltd.